Development of cPAH PRG for shellfish and fish consumption (RAO 2)

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Table 2 of Appendix A of the LWG 2009 PRG report contains the following BSAR for benzo(a)pyrene in field clams:

$$\ln(C_{tiss}) = 0.60 \times \ln(C_{sed}) + \ln(CF) - 2.47$$

Rearranging the equation to solve this equation for sediment concentrations:

$$\ln(C_{sed}) = \frac{\ln(C_{tiss}) - \ln(CF) + 2.47}{0.60}$$

Since:

$$C_{tiss}(wet\ weight) = \frac{C_{tiss}\ (lipid\ normalized)}{f_{lipid}}$$

$$C_{sed}(dry\ weight) = \frac{C_{sed}\ (OC\ normalized)}{f_{oc}}$$

the equation becomes:

$$\ln\left(\frac{C_{sed-dry\ weight}}{f_{oc}}\right) = \frac{\ln\left(\frac{C_{tiss-wet\ weight}}{f_{lipid}}\right) - \ln(CF) + 2.47}{0.60}$$

then:

$$\ln(C_{sed\text{-}dry\ weight}) - \ln(f_{oc}) = \frac{(\ln(C_{tiss\text{-}wet\ weight}) - \ln(f_{lipid})) - \ln(CF) + 2.47}{0.60}$$

or:

$$\ln(C_{sed-dry\ weight}) = \left[\frac{(\ln(C_{tiss\text{-}wet\ weight}) - \ln(f_{lipid})) - \ln(CF) + 2.47}{0.60}\right] + \ln(f_{oc})$$

And finally:

$$C_{sed\text{-}wet\ weight} = e^{\left[\frac{(\ln(C_{tiss\text{-}wet\ weight}) - \ln(f_{lipid})) - \ln(CF) + 2.47}{0.60}\right] + \ln(f_{oc})}$$

With the “conversion factor” = 2.31, f_{oc}= 0.0171, and f_{lipid} for field clams = 0.022, the equation simplifies to

$$C_{\text{sed- wet weight}} = e^{8.28}$$

Which equals 3,947 µg/kg. EPA is using this number in the PRG table for protection of fish and shellfish. We are further exploring the floor concentration in sediment where detections in fish and shellfish are not observed as a check on this number.